

**A SURVEY OF FUNCTIONAL ANALYSIS METHODS FOR  
QIT  
QIC890–PMATH990  
WINTER 2021**

VERN I. PAULSEN

This course is a quick survey of the key concepts and results from functional analysis needed by researchers in quantum information theory. Concepts will be developed but proofs will only be presented as needed.

Graduate students in Pure Mathematics with an interest in functional analysis are encouraged to take PMATH 753 and PMATH 810, where many, but not all, of these topics are presented in greater depth.

Topics to be covered include: metric and topological spaces, Banach spaces, Hilbert space, operators on Hilbert space, spectral theory, compact operators, the Schatten classes, unbounded operators and self-adjointness problems, Stone's theorem, Von Neumann algebras,  $C^*$ -algebras.

Lecture notes will be provided. Lectures will be available online, both live and taped. Grades will be based on weekly problem assignments.